

What is claimed is:

1. A multi-mode block-coded modulation/demodulation method that performs one-way transmission of a multi-mode digital signal by using, between at least two different modes, different settings for (1) number of levels, (2) code of levels, (3) method of set-partitioning and (4) method of modulation that are component elements of a multi-level block-coded modulation system.

2. A method according to claim 1, further comprising the step of changing modes for each block code frame.

3. A method according to claim 1, further comprising the step of maximum-likelihood decoding that is carried out on a receiving side by a single Viterbi decoder which uses a trellis diagram that includes all modes.

4. A method according to claim 3, further comprising the step of mode selection and decoding that are carried out simultaneously on the receiving side by performing Viterbi decoding.

5. A method according to claim 1, further comprising the steps of inserting transmission mode information as an encoded mode index of codes of one or more level, and changing the codes of other levels according to a mode.

6. A method according to claim 5, further comprising the steps of using a mode-index code as a highest level code and using information of the mode-index code for a first bifurcation in a bit partitioning method.

7. A method according to claim 1, further comprising the step of realizing a multi-mode system that is composed by assigning different bit series to modulation signal points having identical coordinates in a signal space diagram.

8. A method according to claim 5, further comprising the steps of realizing on an

encoding side a multi-mode system that is composed by assigning different bit series to modulation signal points having identical coordinates in a signal space diagram, and using on a decoding side a mode decoding result to determine multiple bit series assignments to identical signal points on a signal space diagram.

9. A method according to claim 1, further comprising the step of multi-mode transmission that is carried out in which numbers of transmission symbols are identical to numbers of block code bits.

10. A method according to claim 5, further comprising the steps of using a mode-index code as a highest level code, determining a mode on the receiving side by using a multi-level decoding method to decode a highest level, and using a signal to switch a lower-level decoder, which signal is decoded by the multi-level decoding method.

11. A method according to claim 1, further comprising the step of using at each level an error-protected transmission signal that contains an unequal error protection portion that differs according to a mode and an equal error protection portion.

12. A method according to claim 1, further comprising the step of, when a transmission is from a mobile station in a wireless communications system, switching transmission modes according to movement status of the mobile station.

13. A method according to claim 1, further comprising the step of, when a transmission is from a mobile station of a mobile wireless communications system, switching transmission modes according to a noise environment of the mobile station.